From abstract to impact in cardiovascular research: factors predicting publication and citation

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Abstract: Through a 4-year follow-up of the abstracts submitted to the European Society of Cardiology Congress in 2006, we aimed at identifying factors predicting high-quality research, appraising the quality of the peer review and editorial processes, and thereby revealing potential ways to improve future research, peer review, and editorial work.Methods and resultsAll abstracts submitted in 2006 were assessed for acceptance, presentation format, and average reviewer rating. Accepted and rejected studies were followed for 4 years. Multivariate regression analyses of a representative selection of 10% of all abstracts (n= 1002) were performed to identify factors predicting acceptance, subsequent publication, and citation. A total of 10 020 abstracts were submitted, 3104 (31%) were accepted for poster, and 701 (7%) for oral presentation. At Congress level, basic research, a patient number >/= 100, and prospective study design were identified as independent predictors of acceptance. These factors differed from those predicting full-text publication, which included academic affiliation. The single parameter predicting frequent citation was study design with randomized controlled trials reaching the highest citation rates. The publication rate of accepted studies was 38%, whereas only 24% of rejected studies were published. Among published studies, those accepted at the Congress received higher citation rates than rejected ones.ConclusionsResearch of high quality was determined by study design and largely identified at Congress level through blinded peer review. The scientometric follow-up revealed a marked disparity between predictors of full-text publication and those predicting citation or acceptance at the Congress.

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From Abstract to Impact in Cardiovascular Research – Factors Predicting Publication and Citation

Supplemental Online Material

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Running title: Output and Quality in Cardiovascular Science

Key words: *Scientific quality; predictors; gender; economy*

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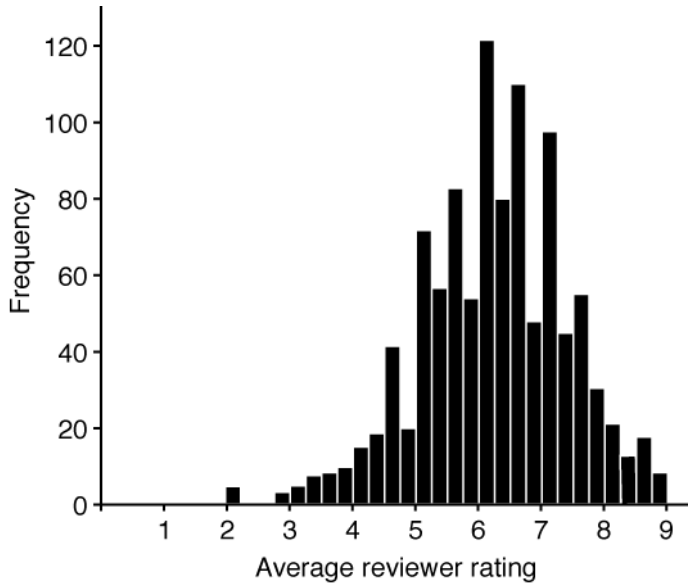
Supplemental Methods

Identification of Author Gender

Surnames and first names of the submitting authors as well as the home institution of all authors were known for all abstracts. Gender identification was performed according to the following algorithm: For authors originating from German speaking countries (respective home institution in Germany, Austria or Switzerland) the gender was identified by the use of common first names, such as “Sebastian” or “Tobias” in men, and “Sabine” or “Christine” in women. Genders of authors originating from French speaking countries (France, Canada, Switzerland) were as well identified by their use of common first names, with e.g. “Jacques” being male and “Valérie” being female. Genders of authors originating from English speaking countries (United Kingdom, Ireland, United States of America, Australia, New Zealand, Canada) with common first names, such as “Jonathan” (male) or “Lisa” (female), were also identified by their first names using a similar approach. Genders of authors originating from Italy were as well identified by their first names with all first names ending on “o” such as “Francesco” assumed to be men and others such as “Adriana” or “Simona” assumed to be women. For Greek and Slovak authors, gender was identified by the respective surnames with all surnames ending on “s”, such as “Papagiannis” or “Krasadakis”, assumed to be men and others, such as “Papadopoulou” or “Avgerinou”, assumed to be women. Genders of Czech and Slovak authors were also identified by their surnames with all surnames ending on “-ová” assumed to be women, such as “Lenková” or “Sotniková”, and others like “Kuchar” or “Stasiák” assumed to be men. For all other authors, and those with uncommon first- or surnames, a photograph from their home institution was assessed through google images using their first name and surname together with their home institution as search terms. If no image from the home institution was available, other online sources for images clearly identifying the respective author by first name and surname in the respective city and country were sought. If no gender could be identified within 15 minutes the gender was marked as unknown. After completion of data collection, gender identification was double-checked by Eirini Liova, a language expert and proficient speaker of Greek, Russian, Romanian and English.

Figure S1



The peer review process of the ESC Congress 2006: All abstracts submitted were peer-reviewed in a blinded fashion by three to eight expert reviewers, and graded on a scale from one to ten. The frequencies of the average reviewer rating showed a central tendency. Ratings were not normally distributed.

Table S1: Prediction of oral presentation among accepted studies

Parameters	Poster presentation rate [% accepted (n)]	Oral presentation rate [% accepted (n)]	Univariate reg. OR, 95% CI (p)	Multivatiate reg. OR, 95% CI (p)
Type of research				
Clinical	81.6 (270)	18.4 (61)	*ref.*	
Basic	71.1 (32)	28.9 (13)	0.56, 0.28-1.12 (0.101)	n.i.
Type of institution				
Not university-affiliated	74.6 (50)	25.4 (17)	*ref.*	
University-affiliated	81.6 (252)	18.4 (57)	0.67, 0.36-1.24 (0.198)	n.i.
Study design (clinical)			(0.673)	
Restrospective	81.3 (130)	18.8 (30)	*ref.*	
Prospective non-RCT	82.3 (102)	17.7 (22)	1.04, 0.39-2.76 (0.937)	n.i.
RCT	80.6 (25)	19.4 (6)	0.94, 0.51-1.72 (0.828)	n.i.
Meta-Analysis	66.7 (2)	33.3 (1)	2.17, 0.19-24.69 (0.533)	n.i.
Systematic Review	-	-	-	-
Other	84.6 (11)	15.4 (2)	1.44, 0.28-7.51 (0.662)	n.i.
Number of patients (clinical) *				
<100	83.3 (110)	16.7 (22)	*ref.*	
≥100	79.6 (152)	20.4 (39)	1.28, 0.72-2.29 8 (0.398)	n.i.
Study field (clinical)			(0.333)	
Cardiac imaging, computational, acute cardiac care	84.8 (39)	15.2 (7)	*ref.*	
Rhythmology	70.0 (28)	30.0 (12)	1.91, 0.73-5.04 (0.191)	n.i.
Heart failure, left ventricular function, valvular disease, pulmonary circulation	82.1 (46)	17.9 (10)	1.14, 0.44-2.97 (0.791)	n.i.
Coronary artery disease, ischemia	81.0 (34)	19.0 (8)	0.87, 0.31-2.47 (0.790)	n.i.
Interventional cardiology, peripheral circulation, stroke	81.1 (30)	18.9 (7)	1.52, 0.55-4.20 (0.420)	n.i.
Exercise, prevention, epidemiology, pharmacology, nursing	86.8 (46)	13.2 (7)	0.68, 0.23-1.98 (0.479)	n.i.
Hypertension, myocardial and peri-cardial disease, cardiovasc. surgery	75.7 (28)	24.3 (9)	1.62, 0.60-4.38 (0.345)	n.i.
Other	95.0 (19)	5.0 (1)	n.a.	-
Gender first author †				
Male	82.3 (237)	17.7 (51)	*ref.*	
Female	73.9 (65)	26.1 (23)	1.64, 0.94-2.89 (0.084)	n.i.
Gender last author ‡				
Male	79.8 (257)	20.2 (65)	*ref.*	
Female	84.3 (43)	15.7 (8)	0.74, 0.33-1.64 (0.453)	n.i.

OR=odds ratio, CI=confidence interval, RCT=randomized controlled trial, *ref.*=reference variable for odds ratio calculation,
Analyses performed on representative 10% selection (n=1002), margin of error<0.01.
**)* In 46 clinical studies no information on the number of patients was provided.
†) In 18 studies no gender for the first author could be identified.
‡) In 29 studies no gender for the last author could be identified.
n.i. = variable not included in final step of regression model (backward conditional variable exclusion), no significant association.
Backward conditional variable exclusion, c-statistic=0.570.

Table S2: Overall output of studies submitted to the ESC 2006

Parameters		total citations	2-year citations	Impact factor
Mean		11.0	6.0	4.3
Sum		3216	1754	1264.3
Percentiles	*25*	0.0	0.0	1.6
	50	3.0	2.0	3.1
	75	10.0	6.0	5.4
	80	13.0	7.0	6.0
	85	20.0	9.0	7.6
	90	22.6	12.0	9.8
	95	40.9	20.6	14.8
	99	141.7	67.7	15.7

Table S2 Overall output of studies submitted to the ESC 2006: Studies were followed for four years for publication and citation. Values refer to a random selection of ten percent (n=1002, margin of error 0·01)1 of all studies submitted (n=10.020). All studies submitted to the ESC in 2006 led to 2930±29 publications that yielded 32.160±322 total citations and an overall impact of 12.643±126.

Table S3: Scientific output of the ESC 2006 by gender

		Male [% total (n)]	Female [% total (n)]	P-value (Fisher's Exact)	OR (95% C.I.)
Acceptance at the ESC Congress	*first author* †	39.8% (288)	33.7% (88)	0.088	0.768 (0.571-1.034)
	last author ‡	38.2% (322)	38.9% (51)	0.923	1.030 (0.706-1.052)
Publication	*first author* †	30.0% (217)	27.2% (71)	0.428	0.877 (0.640-1.203)
	last author ‡	30.8% (259)	19.1% (25)	**0.004**	0.505 (0.317-0.805)
≥ 10 2-year citations	*first author* †	14.3% (31)	18.3% (13)	0.449	1.338 (0.657-2.725)
	last author ‡	16.6% (43)	4.0% (1)	0.143	0.218 (0.029-1.661)

OR=odds ratio, C.I.=confidence interval, male authors served as reference for odds ratio calculation.
Random 10% selecetion (n=1002), representative for all abstracts submitted (n=10,020), margin of error<0.01.
†) In 18 studies no gender for the first author could be identified.
‡) In 29 studies no gender for the last author could be identified.

Table S4: Comparison of variable distribution in the 10% random selection (n=1002) and the complete study sample (100% of cases, n=10 020)

Test variable	Test group	Ranks [n]	Mean rank	Sum of ranks	Man-Whitney U	Asymp. Sig. (two-tailed)
Av. rev. rating	selected 10%	1 002	5 544.06	5 555 151	4 987 392	0.734
	100%	10 020	5 508.24	55 192 602		
Pres. format	selected 10%	1 002	5 486.7	5 497 671	4 995 168	0.762
	100%	10 020	5 513.98	55 250 082		
Topic	selected 10%	1 002	5 541.64	5 552 721.5	4 989 818.5	0.752
	100%	10 020	5 508.49	55 195 028.5		

To secure that the computer-assisted random selection of 10% of all cases was representative, the distributions of common test variables were compared. Average reviewer rating: 150 categories, presentation format: 3 categories, Topic: 27 categories. Asymptomatic significances are displayed. No significant differences were obeserved.

Table S5: Pilot assessment of agreement and intraclass correlation between the four reviewers

A

Test variable	n	av. pairw. agreement [%]	rev. 1 vs. 4	rev. 1 vs. 3	rev. 1 vs. 2	rev. 2 vs. 4	rev. 2 vs. 3	rev. 3 vs. 4	Fleiss' kappa
Institutional affiliation	30	96.697	92.593	96.296	100.00	92.593	96.296	96.296	0.862
gender, first author	30	96.296	96.296	96.296	92.593	96.296	96.296	100.00	0.853
gender, last author	30	98.148	96.296	96.296	96.296	100.00	100.00	100.00	0.943
study design	30	93.872	92.593	8.889	96.296	96.296	92.593	96.296	0.886
type of research (clin. vs. basic)	30	100.00	100.00	100.00	100.00	100.00	100.00	100.00	1.000
publication status	30	100.00	100.00	100.00	100.00	100.00	100.00	100.00	1.000

B

Test variable	n	ICC (95% CI)
If clinical, patient no.	28	0.999 (0.996-0.999)
If published, total citations	10	1.00 (1.00-1.00)
If published, 2y citations	10	0.996 (0.990-0.999)

In a pilot study a random sample of 30 abstracts (3% of the study sample) was independently assessed by each of the four reviewers. Agreement (categorical variables, A) and intraclass correlation (continuous variables, B) for all variables was assessed. av. pairw. agreement=average pairwise agreement, rev.=reviewer, clin.=clinical, ICC=intraclass correlation coefficient, CI=confidence interval, 2y= two year.

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